Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number | Candidate Number

Physics

Paper 2

Foundation Tier

Friday 15 June 2018 – Morning
Time: 1 hour 45 minutes

Paper Reference
1PH0/2F

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an **asterisk (*)**, marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.
- A list of equations is included at the end of this exam paper.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 (a) Complete the following sentences using one of the phrases from the box below.

efficiency is reduced the national grid a power station heat loss is reduced a transformer

(i) Electrical power is generated at

(1)

....

(ii) Electricity is transmitted over long distances by transmission lines that are part of

(1)

....

(iii) Electricity is transmitted at high voltages so that

(1)

....

(b) Which statement is true for transformers?

(1)

☐ **A** Transformers can only step-up voltages.

☐ **B** Transformers can only step-down voltages.

☐ **C** Transformers can work with direct current.

☐ **D** Transformers have primary and secondary coils.

(c) In a small transformer

- the primary voltage is 230 V
- the primary current is 0.020 A
- the secondary voltage is 5.0 V

Calculate the secondary current.

Use the equation

$$I_s = \frac{V_p \times I_p}{V_s}$$

(2)

secondary current = ... A

(Total for Question 1 = 6 marks)

2 (a) Figure 1 shows a fixed mass of gas inside a cylinder with a movable piston.

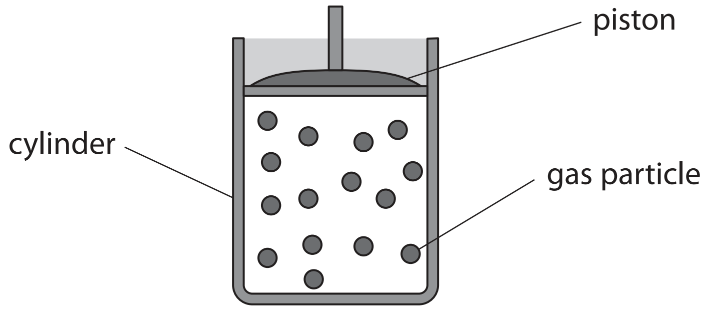

Figure 1

(i) Describe, in terms of **gas particles**, how the gas exerts a pressure on the cylinder.

(3)

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(ii) Figure 2 shows the same gas squashed into a smaller volume.

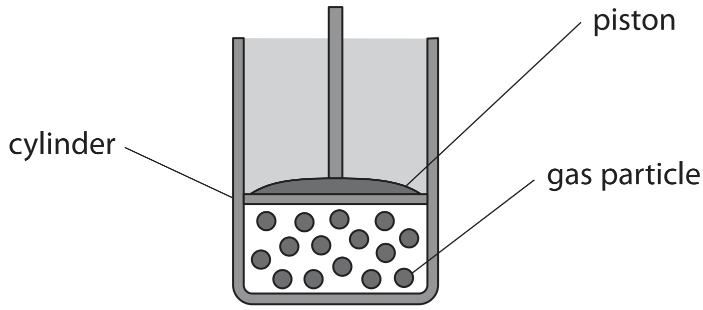

Figure 2

State what happens to the pressure the gas exerts on the cylinder when the volume of gas is reduced, as in Figure 2.

(1)

....

....

(iii) State what happens to the gas particles when the volume of the gas is reduced, as in Figure 2.

(1)

....

....

(b) Figure 3 shows an oxygen cylinder.

Figure 3

The volume of the gas in the cylinder is 2100 cm³.

When the gas is released into the atmosphere the volume of the gas is 8600 cm³.

The pressure of the atmosphere is 98 kPa.

Calculate the pressure of the gas when it is in the cylinder.

Use the equation

$$P_1 = \frac{P_2 \times V_2}{V_1}$$

(2)

pressure of the gas in the cylinder = ... kPa

(Total for Question 2 = 7 marks)

3 (a) Figure 4 shows the magnetic field produced by a current in a long, straight wire.

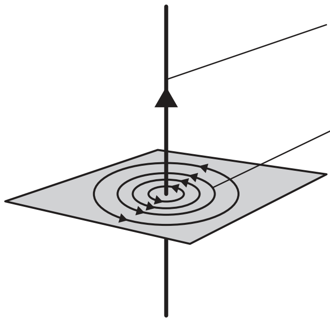

Figure 4

Which row of the table is correct when the strength of the magnetic field is greatest?

(1)

	distance from the wire	current
☒ **A**	small	small
☒ **B**	small	large
☒ **C**	large	small
☒ **D**	large	large

(b) Which of these materials would be the most suitable for making a temporary magnet?

(1)

☒ **A** copper

☒ **B** iron

☒ **C** plastic

☒ **D** steel

(c) Figure 5 shows a magnet holding some paper clips.

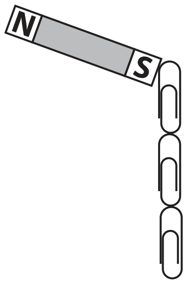

Figure 5

Describe how a student could show that the paper clips are induced magnets.

(2)

....

....

....

....

(d) Describe how you could show that the Earth has a magnetic field.

(2)

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....

....

(e) A student uses a compass to investigate the magnetic field near a bar magnet.

The student places the compass near the bar magnet as shown in Figure 6.

Figure 6

(i) Mark the north pole of the bar magnet with an 'N' in Figure 6.

(1)

(ii) State two ways in which the investigation could be developed to show the shape of the magnetic field around the bar magnet.

You may add to Figure 6 to help with your answer.

(2)

1 ....

....

2 ....

....

(Total for Question 3 = 9 marks)

4 (a) (i) Which of these forces keeps the Moon moving around the Earth?

(1)

- ☒ **A** contact
- ☒ **B** electrostatic
- ☒ **C** gravitational
- ☒ **D** magnetic

(ii) Which of these is a scalar quantity?

(1)

- ☒ **A** velocity
- ☒ **B** momentum
- ☒ **C** energy
- ☒ **D** acceleration

(b) Figure 7 shows a box at rest on a floor.

The force that the floor exerts on the box is shown by the vector in Figure 7.

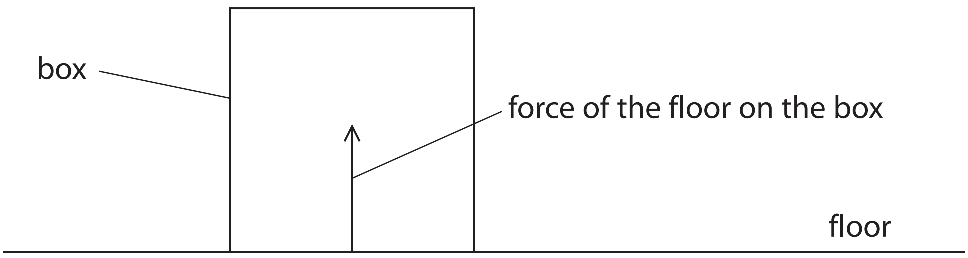

Figure 7

Add another vector to the diagram in Figure 7 to show the weight of the box.

(2)

(c) Figure 8 shows part of a cart.

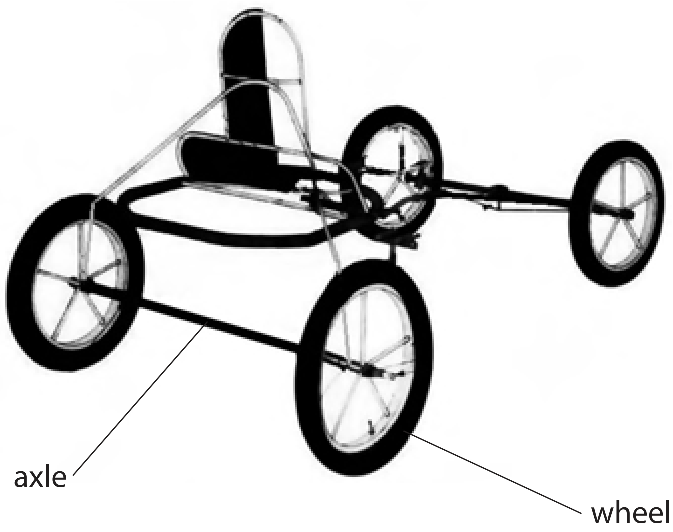

Figure 8

When the wheels turn the axles become warm.

(i) Explain why the axles become warm when the wheels turn.

(2)

....

....

....

....

(ii) Give **one** way of reducing the heating of the axles when the wheels turn.

(1)

....

....

(d) (i) Complete the equation that relates efficiency, useful energy transferred by a device and total energy supplied to the device.

(1)

efficiency = ——————————————————

(ii) In one second an engine has a total energy input of 7500 J.

In one second 3200 J is transferred to the surroundings as wasted energy.

Calculate the useful energy transferred by the engine.

(1)

useful energy transferred = ... J

(iii) Calculate the efficiency of this engine.

(2)

efficiency of the engine = ...

(Total for Question 4 = 11 marks)

5 (a) (i) Figure 9 shows two gears.

Gear Q moves clockwise as shown by the arrow.

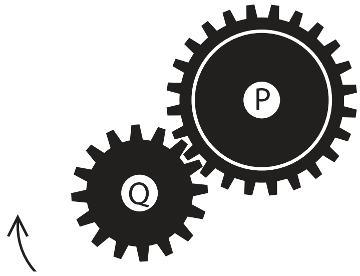

Figure 9

Which of these describes how gear P moves?

(1)

☒ **A** anticlockwise, slower than gear Q

☒ **B** anticlockwise, faster than gear Q

☒ **C** clockwise, slower than gear Q

☒ **D** clockwise, faster than gear Q

(ii) Figure 10 shows the number of teeth on the gears.

Gear P has 24 teeth, gear Q has 16 teeth.

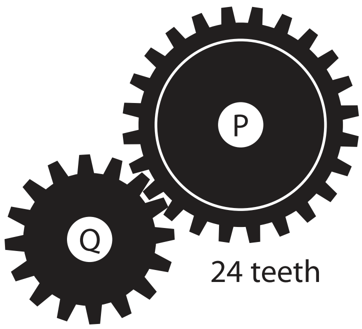

Figure 10

Which of these gives the ratio of the number of teeth on gear P to the number of teeth on gear Q?

(1)

☒ **A** 24 − 16

☒ **B** 16 + 24

☒ **C** 3 : 2

☒ **D** 2 : 3

P 6 0 4 6 7 A 0 1 2 3 2

(b) Figure 11 shows a lever used to lift a heavy load.

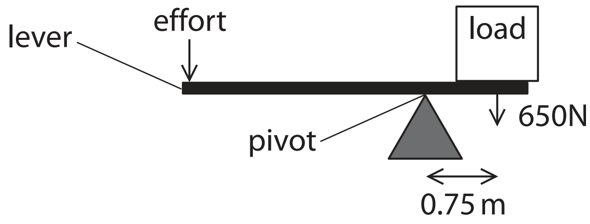

Figure 11

(i) The weight of the load is 650 N.
The centre of the load is 0.75 m from the pivot.

Calculate the moment of the load about the pivot.
State the unit.

Use the equation

moment = force × distance from the pivot

(3)

moment = ... unit ....

(ii) State the principle of moments.

(1)

....

....

(iii) An effort of 160 N is applied to the end of the lever to balance the load in Figure 11.

Calculate the distance between the effort and the pivot.

(3)

distance = ... m

(Total for Question 5 = 9 marks)

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6 (a) Figure 12 shows a graph of current against potential difference for an electrical component.

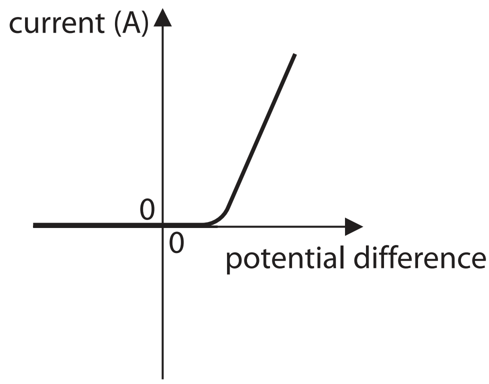

Figure 12

Which electrical component will show this variation of current with potential difference?

(1)

☒ **A** thermistor

☒ **B** low value resistor at constant temperature

☒ **C** high value resistor at constant temperature

☒ **D** diode

(b) A lamp is connected to a potential difference of 0.24 V.

The current in the lamp is 0.12 A.

(i) Calculate the power of the lamp.

Use the equation

$P = I \times V$

(2)

power of the lamp = ... W

(ii) The potential difference is changed to 0.30 V.
The current in the lamp is now 0.13 A.

The lamp is switched on for 35 s.

Calculate the energy that is transferred in this time.
Select an equation from the list of equations at the end of this paper.

(2)

energy transferred = ... J

(iii) The current in the lamp stays at 0.13 A.

Calculate the charge that flows through the lamp in 35 s.
Use the equation

$Q = I \times t$

(2)

charge = ... C

(c) A student measures the current in the lamp for several values of potential difference across the lamp.

Figure 13 shows the student's results.

potential difference across the lamp in volts (V)	current through the lamp in amps (A)
0.06	0.05
0.12	0.08
0.18	0.10
0.24	0.12
0.30	0.13
0.36	0.13

Figure 13

The student uses the results in Figure 13 to write this conclusion.

'*As the potential difference across the lamp increases, the current in the lamp increases and the relationship is directly proportional.*'

Comment on the student's conclusion.

(3)

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(Total for Question 6 = 10 marks)

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7 (a) The graph in Figure 14 shows the variation in atmospheric pressure with the height above sea level.

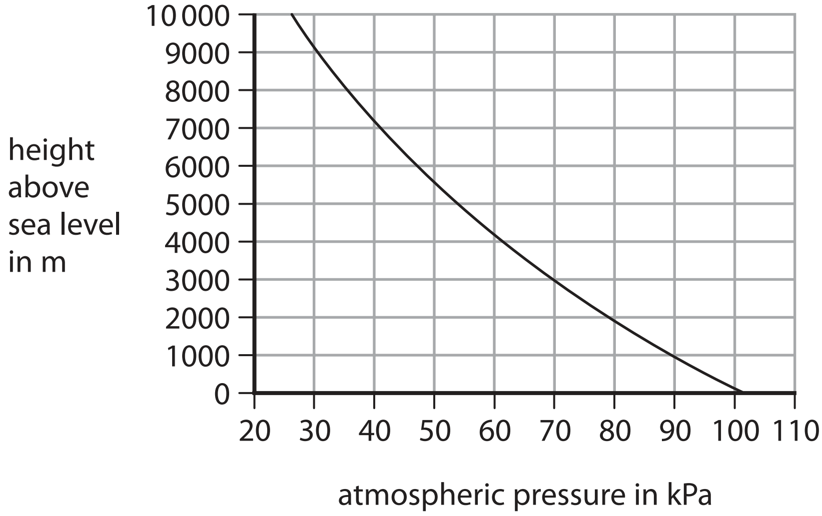

Figure 14

(i) Use the graph to estimate the atmospheric pressure at 3000 m above sea level.

(1)

atmospheric pressure = ... kPa

(ii) Use the graph to estimate the atmospheric pressure at 6000 m above sea level.

(1)

atmospheric pressure = ... kPa

(iii) Suggest a reason why the atmospheric pressure decreases with height above sea level.

(1)

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(b) Figure 15 shows different water levels in two similar water containers with taps.

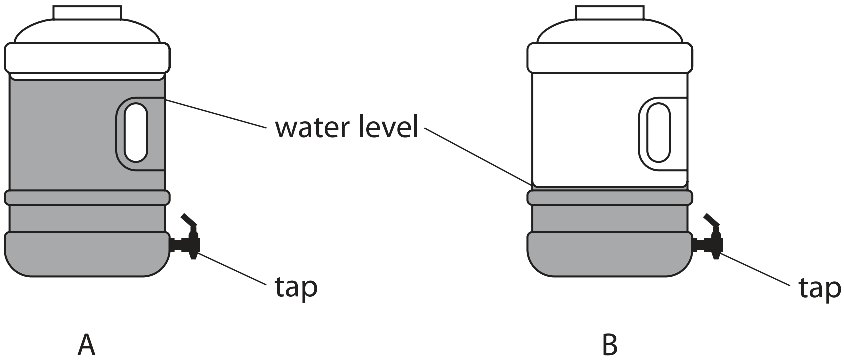

Figure 15

Explain why the water runs out of the tap of container A faster than out of the tap of container B.

(2)

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....

....

....

(c) 10 m of sea water exerts the same pressure as the atmosphere.

A submarine is at a depth of 50 m below the surface of the sea.

Calculate how many times greater the pressure is on the submarine than atmospheric pressure.

(2)

pressure = ... times greater *(d) Figure 16 illustrates an effect that can be explained using the ideas of pressure, force and area.

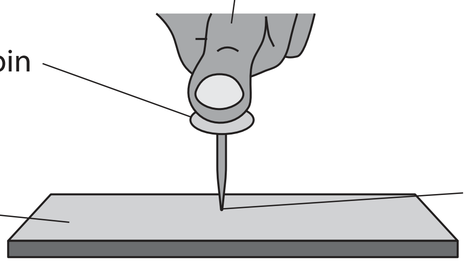

Figure 16

Explain why the tip of the drawing pin goes into the wood but the head of the drawing pin does not go into the thumb.

(6)

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(Total for Question 7 = 13 marks)

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P 6 0 4 6 7 A 0 2 1 3 2

8 (a) A student uses the apparatus in Figure 17 to determine the specific heat capacity of water.

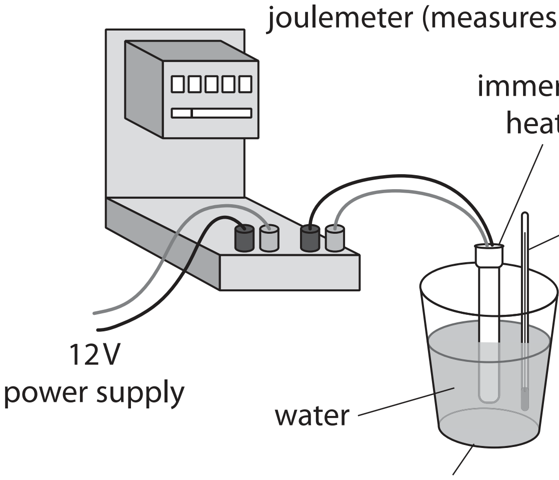

Figure 17

(i) State the measurements needed to calculate the specific heat capacity of water.

(4)

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....

(ii) State **two** ways that the apparatus could be adapted to improve the procedure.

(2)

1 ....

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2 ....

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(b) The student decides to measure the temperature of the water every minute while it is being heated.

Figure 18 shows a graph of the student's results.

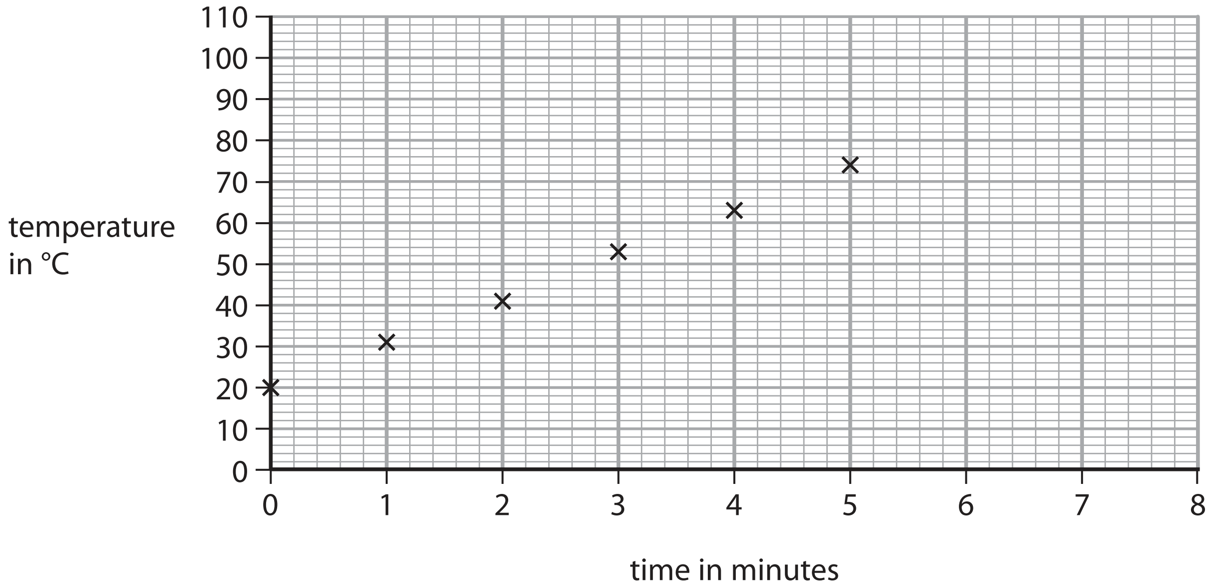

Figure 18

Predict the temperature of the water if the heating continues up to 8 minutes.

(1)

temperature of the water = ... °C

(c) Another student decides to melt some ice.

The student melts 380 g of ice at 0 °C.

The specific latent heat of fusion of ice is 3.34×10^5 J/kg.

Calculate the thermal energy needed to melt the ice.

Select an equation from the list of equations at the end of this paper.

(2)

thermal energy needed = ... J

(d) The volume of 380 g of ice is 410 cm^3.

Calculate the density of the ice in g/cm^3.

(2)

density = ... g/cm^3

(Total for Question 8 = 11 marks)

P 6 0 4 6 7 A 0 2 4 3 2

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9 A cyclist is riding a bicycle at a steady velocity of 12 m/s.

The cyclist and bicycle have a total mass of 68 kg.

(a) Calculate the kinetic energy of the cyclist and bicycle.

Use the equation

$$KE = \frac{1}{2} \times m \times v^2$$

(2)

kinetic energy = ... J

(b) Describe the energy transfers that happen when the cyclist uses the brakes to stop.

(2)

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....

(c) The cyclist starts to cycle again.

The cyclist does 1600 J of useful work to travel 28 m.

Calculate the average force the cyclist exerts.

(3)

average force = ... N *(d) A class of students investigate the power output of each student in the class.

The class must decide whether they use a method using steps or a method using weights. The whole class must use the same method.

Plan what measurements the students should take and how these can be used to calculate and compare the power output of each student.

You may draw a diagram to help with your plan.

(6)

(Total for Question 9 = 13 marks)

10 (a) A student rubs a plastic comb with a dry cloth to give the comb a positive electric charge.

Figure 19 shows the charged plastic comb picking up small pieces of paper.

(Source © GIPhotoStock/SCIENCE PHOTO LIBRARY)

Figure 19

(i) Explain how rubbing the comb with a dry cloth gives the comb a positive electric charge.
(3)

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....

(ii) Explain how the positively-charged plastic comb picks up the small pieces of paper.
(3)

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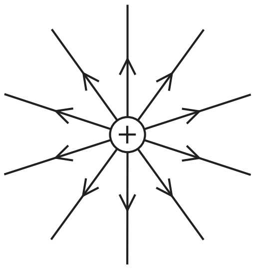
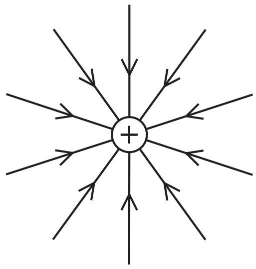
(b) Which of these diagrams shows the shape and direction of the electric field around a positive point charge?

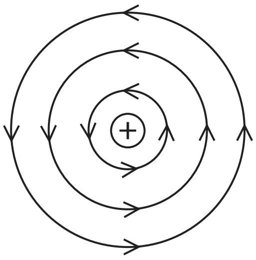
(1)



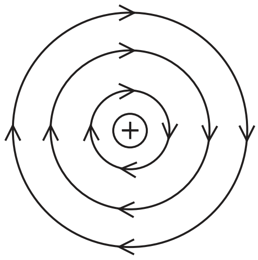
☒ **A**



☒ **B**



☒ **C**



☒ **D**

(c) Figure 20 shows two metal spheres.

Metal sphere A is fixed to a table.
Metal sphere B can be moved.

Metal sphere B is placed at a short distance from metal sphere A.

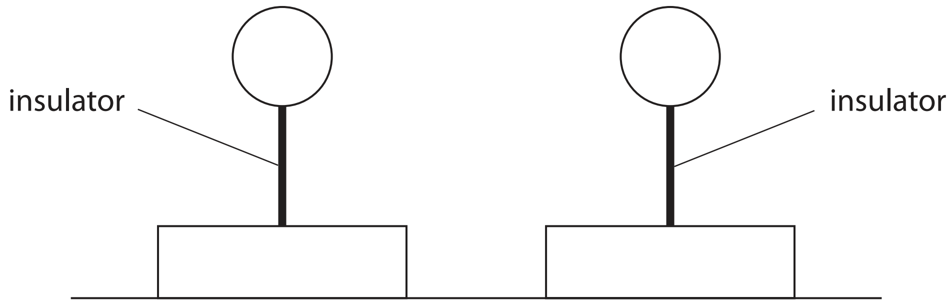


Figure 20

Both spheres are insulated from the table and given a negative charge.

The force between the charged spheres is measured.

(i) Explain, in terms of electric fields, why a force is exerted on sphere B.

(2)

....

....

....

....

(ii) Sphere B is moved and the force between the spheres is measured at several different distances.

Figure 21 is a graph of force on sphere B against distance between the centres of the spheres.

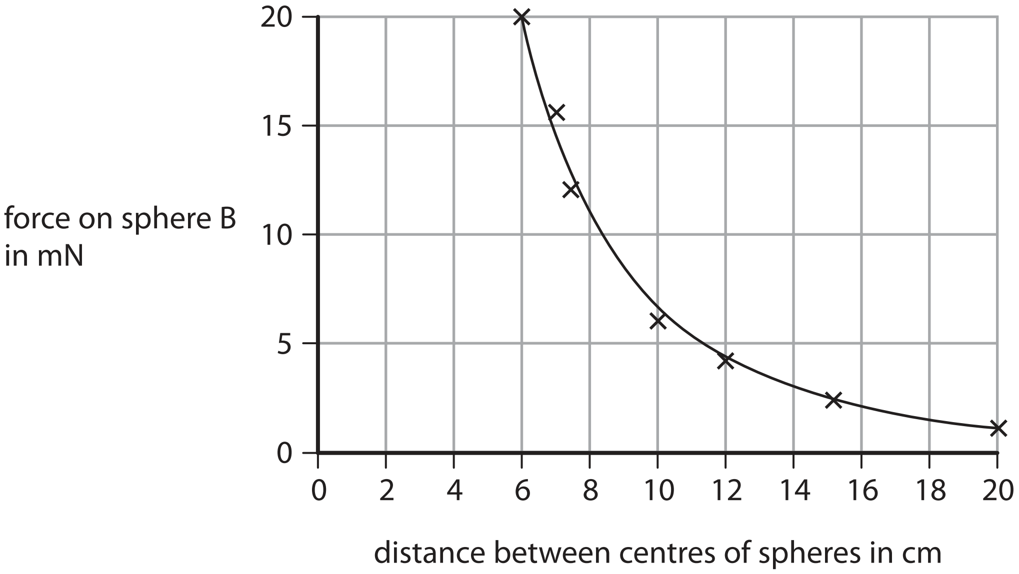


Figure 21

Describe how the force on sphere B varies with the distance between the centres of the spheres.

(2)

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....

....

....

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

Equations

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance $v^2 - u^2 = 2 \times a \times x$
energy transferred = current × potential difference × time $E = I \times V \times t$
potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil $V_p \times I_p = V_s \times I_s$
change in thermal energy = mass × specific heat capacity × change in temperature $\Delta Q = m \times c \times \Delta\theta$
thermal energy for a change of state = mass × specific latent heat $Q = m \times L$
to calculate pressure or volume for gases of fixed mass at constant temperature $P_1 V_1 = P_2 V_2$
energy transferred in stretching = 0.5 × spring constant × (extension)^2 $E = \frac{1}{2} \times k \times x^2$